GRADE 12
DIPLOMA EXAMINATION

Biology 30

January 1988

Alberta
EDUCATION

GRADE 12 DIPLOMA EXAMINATION
BIOLOGY 30

DESCRIPTION

Time: 2½ hours

Total possible marks: 100

This is a **CLOSED-BOOK** examination consisting of two parts:

PART A: 80 multiple-choice questions each with a value of 1 mark.

PART B: Five written-response questions for a total of 20 marks.

GENERAL INSTRUCTIONS

Fill in the information on the answer sheet as directed by the examiner.

For multiple-choice questions, read each carefully and decide which of the choices BEST completes the statement or answers the question. Locate that question number on the answer sheet and fill in the space that corresponds to your choice. USE AN HB PENCIL ONLY.

Example

This examination is for the subject area of

A. Chemistry
B. Biology
C. Physics
D. Mathematics

Answer Sheet

A	B	C	D
①	●	③	④

If you wish to change an answer, please erase your first mark completely.

For written-response questions, read each carefully, and write your answer in the space provided in the examination booklet.

NOTE: The perforated pages at the back of this booklet may be torn out and used for your rough work.

DO NOT FOLD EITHER THE ANSWER SHEET OR THE EXAMINATION BOOKLET

The presiding examiner will collect the answer sheet and examination booklet for transmission to Alberta Education.

JANUARY 1988

PART A

INSTRUCTIONS

There are 80 multiple-choice questions with a value of one mark each in this section of the examination. Use the separate answer sheet provided and follow the specific instructions given.

NOTE: The perforated pages at the back of this booklet may be torn out and used for your rough work.

WHEN YOU HAVE COMPLETED PART A, PROCEED DIRECTLY TO PART B

DO NOT TURN THE PAGES TO START THE EXAMINATION UNTIL TOLD TO DO SO BY THE PRESIDING EXAMINER

1. Energy needed to maintain cellular activity is produced

A. during active transport
B. only under aerobic conditions
C. only under anaerobic conditions
D. during anaerobic and aerobic conditions

2. The function of ribosomes is to

A. produce ATP
B. produce RNA
C. secrete enzymes
D. aid in the production of proteins

3. Which process allows a substance to enter a cell without actually passing through the cell membrane?

A. Diffusion
B. Exocytosis
C. Endocytosis
D. Active transport

Interpret the following data to answer question 4.

Type of Ion	Typical Concentration (millimoles/L)		
	Maintained in Seaweed Cell	Found in Seawater	Found in Brackish (Slightly Salty) Water
Calcium	1.700	12	1.7
Magnesium	0.005	57	6.5
Sulphate	0.010	36	2.8
Sodium	90.000	500	60.0
Potassium	490.000	12	1.4
Chloride	520.000	520	73.0

Note: Assume that the membrane of the seaweed cell is equally permeable to all of the above ions.

4. The ion which enters the cell by diffusion from seawater but enters the cell by active transport from brackish water is

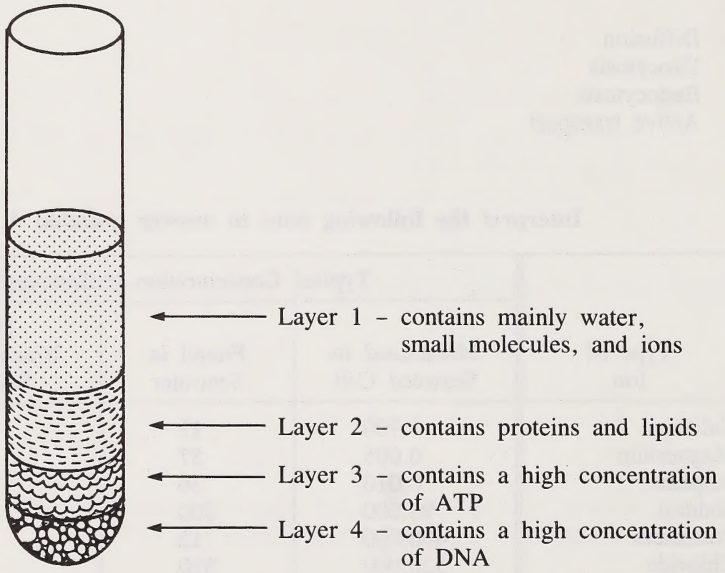
A. sodium
B. sulphate
C. potassium
D. magnesium

5. An organic compound is digested within a cell. The chemical bonds are broken and the energy is converted to a form that the cell can utilize to produce proteins. The sequence of organelles used by the cell to carry out these processes would be

A. lysosome, mitochondrion, ribosome
B. ribosome, mitochondrion, lysosome
C. mitochondrion, ribosome, lysosome
D. lysosome, ribosome, mitochondrion

Use the following information to answer question 6.

Some liver cells were broken up into fragments. These fragments were suspended in water, and the mixture centrifuged to separate it into layers of different densities. Through this process, four distinct layers were obtained as illustrated below.



6. A logical interpretation based on the data would be that

A. layer 1 probably contains most of the cell membrane fragments
B. layer 2 probably contains most of the cell membrane fragments
C. layer 3 probably contains many ribosomes
D. layer 4 probably contains many ribosomes

7. Catalysts function by reducing the

A. amount of substrate in a chemical reaction
B. rate at which the chemical reaction proceeds
C. optimum temperature at which an enzyme works
D. amount of energy required to initiate the chemical reaction

8. When a competitive inhibitor is added to an enzyme-catalyzed reaction, end products will be formed

A. more rapidly because the energy of activation is increased
B. less rapidly because the energy of activation is decreased
C. at a much faster rate because of competition for active sites on the enzyme
D. at a much slower rate because of competition for active sites on the enzyme

9. When the hydrogen ion (H^+) concentration of a solution is lower than the hydroxide ion (OH^-) concentration, the solution is

A. basic with a high pH
B. basic with a low pH
C. acidic with a low pH
D. acidic with a high pH

Use the following information to answer question 10.

An experiment was performed to determine the effect of substance X on human metabolism as indicated by variations in body temperature and thyroid gland secretion. Four comparable groups, consisting of 100 individuals in each group, participated in the experiment. Each individual in groups I to III was given a very small dosage (in micrograms) of substance X. Individuals in group IV were given a placebo (a substance identical in appearance to substance X but not having any of its effects). The results obtained from the four groups are shown below.

Group	Dosage (10^{-6} g/50 kg body mass)	Change in Average Body Temperature (°C)	Change in Average Thyroid Gland Output (10^{-6} g/50 kg body mass)
I*	1 (substance X)	an increase of 0.2	a decrease of 1.0
II*	10 (substance X)	an increase of 0.8	a decrease of 9.9
III*	100 (substance X)	an increase of 1.1	a decrease of 99.9
IV	100 (placebo)	no change	no change

*Groups I, II, and III experienced an increased perspiration rate.

10. The mechanism that relates secretions of the thyroid gland to the effects of substance X in the experimental groups is

A. enzyme breakdown
B. positive feedback
C. negative feedback
D. buffering action of enzymes

---

11. When 3 mL of Biuret reagent are mixed thoroughly with 3 mL of an unknown sample, the mixture turns a violet (or sometimes pink) color. This observation indicates the presence of a

A. lipid
B. protein
C. vitamin
D. carbohydrate

12. Iron is used in the human body to synthesize

A. bile
B. lymph
C. vitamin C
D. hemoglobin

13. Many vitamins act as

A. enzymes
B. coenzymes
C. energy sources
D. essential substrates

14. Which substance is an enzyme?

A. Carbohydrase
B. Gastrin
C. Starch
D. Bile

15. The MAIN function of intestinal villi is to

A. aid in absorption
B. increase peristalsis
C. aid in the absorption of excess stomach acid
D. increase movement of nutrients along the intestine

16. The compounds that store and transmit the information needed to manufacture structures and substances present in body cells are

A. proteins
B. amino acids
C. nucleic acids
D. enzymes and proteins

17. Three secretions that are added to and digest food in the small intestine are

A. intestinal juice, gastric juice, and bile
B. gastric juice, bile, and pancreatic juice
C. bile, pancreatic juice, and intestinal juice
D. pancreatic juice, intestinal juice, and gastric juice

18. Since cells lining the stomach are composed of protein, and the stomach produces enzymes that digest protein, one could infer that the stomach would eventually digest itself. However, the protein-digesting enzymes do not destroy the cells that line the stomach because the

A. proteases in the stomach are deactivated by the low pH

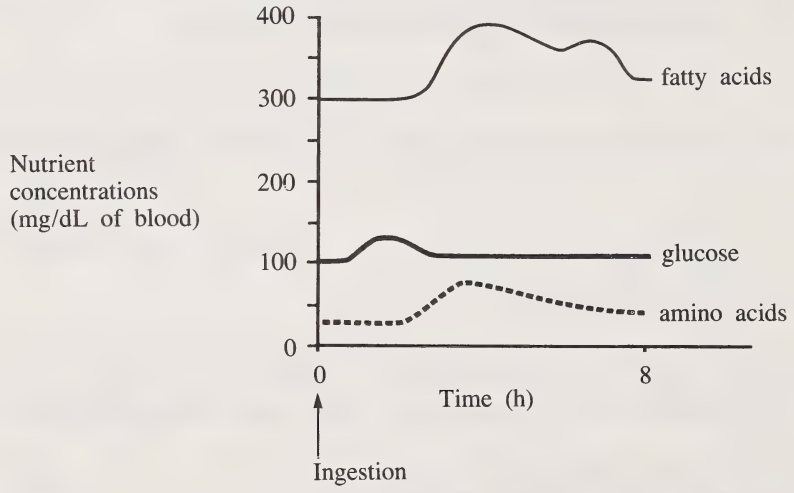
B. stomach lining continually produces new cells as the old ones are worn away

C. stomach lining produces a protective coat and secretes proteases in an inactive form

D. proteases of the stomach are only activated when they come in contact with food in the stomach

Interpret the following information to answer question 19.

Nutrient Concentrations in the Blood over an 8 h Period Following the Ingestion of 800 g of Food



19. According to the rate at which end products are absorbed, the most difficult food substances to digest are

A. fats and then proteins
B. fats and then carbohydrates
C. carbohydrates and then proteins
D. proteins and then carbohydrates

Use the following information to answer question 20.

A student wrote two equations to represent chemical digestion in the stomach.

$$\text{protein} + \text{V} \xrightarrow{\text{enzyme W}} \text{protein} + \text{V}$$

$$\text{protein} + \text{V} \xrightarrow[\text{Y}]{\text{enzyme W}} X_1 + X_2 + X_3$$

20. Hydrochloric acid is represented by the symbol

A. V
B. W
C. X_1
D. Y

---

21. Blood in the pulmonary artery goes directly to the

A. lungs
B. aorta
C. left atrium
D. right atrium

22. Blood clotting is due to formation of the insoluble protein known as

A. fibrin
B. thrombin
C. fibrinogen
D. prothrombin

23. The cellular component that constitutes the greatest mass of whole blood is made up of

A. platelets
B. leukocytes
C. lymphocytes
D. erythrocytes

24. A blood vessel is BEST classified as an artery if it carries

A. oxygenated blood
B. deoxygenated blood
C. blood towards the heart
D. blood away from the heart

25. Blood under the highest pressure would be found in the

A. renal veins
B. venae cavae
C. renal arteries
D. capillary beds of the lungs

26. A patient suffering from anemia has blood that lacks the ability to carry sufficient oxygen. One possible treatment is a transfusion of

A. platelets
B. blood plasma
C. red blood cells
D. white blood cells

Use the following information to answer question 27.

<table>
<tr><td colspan="9">The Cardiac Cycle</td></tr>
<tr><td rowspan="3">Atria</td><td colspan="8">Time in Seconds</td></tr>
<tr><td>0.1</td><td colspan="2">0.2</td><td>0.3</td><td>0.4</td><td>0.5</td><td>0.6</td><td>0.7</td><td>0.8</td></tr>
<tr><td>Contraction</td><td colspan="8">Relaxation</td></tr>
<tr><td>Blood is forced out of the atria</td><td colspan="4">Blood enters from structures I and II</td><td colspan="4">Blood starts to drain into the ventricles before atrial contraction begins</td></tr>
<tr><td rowspan="2">Ventricles</td><td>Relaxation</td><td colspan="4">Contraction</td><td colspan="4">Relaxation</td></tr>
<tr><td>Fill with blood from the atria</td><td colspan="4">Blood empties into structures III and IV</td><td colspan="4">Fill with blood from the atria</td></tr>
</table>

27. Structures III and IV are the

A. pulmonary veins and the aorta
B. pulmonary artery and the aorta
C. pulmonary veins and the venae cavae
D. pulmonary artery and the pulmonary veins

28. Which statement MOST accurately describes the movement of materials between blood capillaries, lymph vessels, and tissue cells?

A. Water leaves the lymph vessels, is collected by blood capillaries, and then moves into tissue cells.

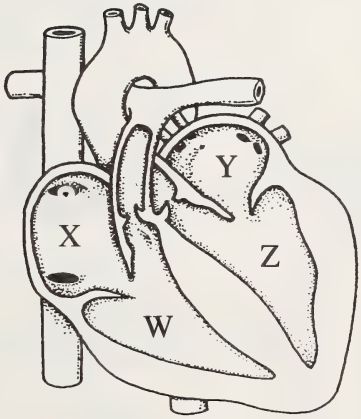
B. Dissolved oxygen and carbon dioxide diffuse out of lymph vessels into blood capillaries, and then into tissue cells.

C. Plasma proteins readily diffuse out of blood capillaries into tissue cells while excess plasma proteins are collected by lymph vessels.

D. Water, glucose, amino acids, and inorganic ions move out of blood capillaries into tissue cells while excess materials are collected by lymph vessels.

Use the following information to answer question 29.

Human Heart



29. Blood in the human heart enters the pulmonary artery from the

A. right ventricle, which is labelled W
B. left ventricle, which is labelled Z
C. right atrium, which is labelled X
D. left atrium, which is labelled Y

---

30. Introduction of foreign protein into the human bloodstream will result in the production of

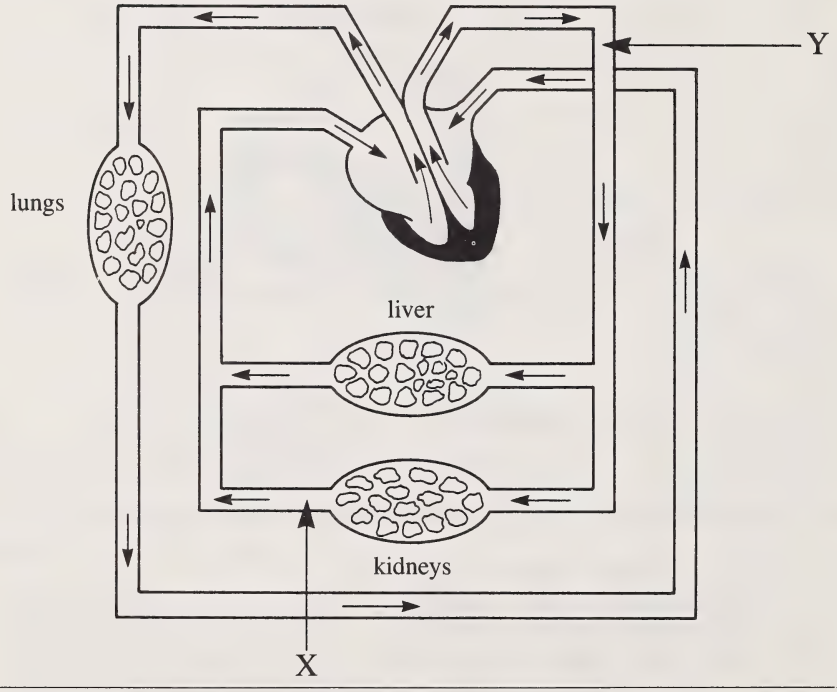
A. antigens by leukocytes
B. antigens by erythrocytes
C. antibodies by leukocytes
D. antibodies by erythrocytes

31. A lab technician is given two bottles of blood-typing serum. It is known that one contains anti-A serum and the other contains anti-B serum, but it is not known which is which. A variety of typed blood is available. The human blood that would be most valuable in identifying the contents of the unmarked serum bottles would be of type(s)

A. O
B. A and B
C. B and O
D. O and AB

Use the following information to answer question 32.

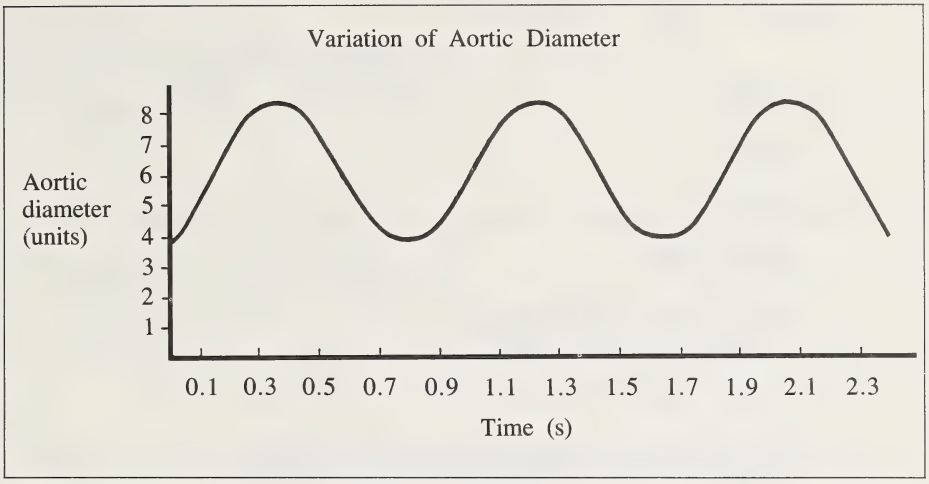
A Model of Pulmonary, Hepatic, and Renal Circulation



32. The main difference between the composition of the blood in the structure labelled X and in the structure labelled Y is that in

A. Y there is a lower urea and carbon dioxide content than in X
B. X there is a higher oxygen and a lower urea content than in Y
C. X there is a higher carbon dioxide and a lower urea content than in Y
D. Y there is a higher carbon dioxide and a lower oxygen content than in X

Use the following information to answer question 33.



33. What time period corresponds to diastole only?

A. 0.0 to 0.3 seconds
B. 0.2 to 0.5 seconds
C. 0.4 to 0.8 seconds
D. 1.7 to 2.1 seconds

---

34. During inhalation the diaphragm is

A. relaxed and curved in shape
B. relaxed and flattened in shape
C. contracted and curved in shape
D. contracted and flattened in shape

35. The intake of carbon monoxide is poisonous to the human body because it immediately

A. affects the muscles used in breathing
B. combines with water to yield carbonic acid
C. prevents oxygen from combining with hemoglobin
D. depresses the breathing centres in the medulla oblongata

36. A nerve impulse from the breathing centre in the brain to the rib muscles causes

A. inhalation
B. exhalation
C. a buildup of carbon dioxide in the blood
D. a decrease in the size of the chest cavity

37. In an experiment, a person's breathing rate was recorded immediately after engaging in a number of activities.

Activity	Breathing Rate (breaths/min)
running	45
resting	15
climbing stairs	50
hyperventilating (taking rapid deep breaths while at rest)	8

The breathing rate after hyperventilating can be accounted for by

A. a decrease in the concentration of O_2 in the blood
B. a decrease in the concentration of CO_2 in the blood
C. an increase in the concentration of CO_2 in the blood
D. an increase in the concentration of hydrogen ions in the blood

---

Use the following data obtained from the medical tests of two individuals to answer question 38.

Individual	Cardiac Output (L/min)	Hemoglobin Content of Blood (g/100 mL of blood)	White Blood Cell Count ($/mm^3$)	O_2 Content of Arterial Blood (mL/100 mL of blood)
X (Normal)	5.3	15	8 000	19.5
Y	6.3	16	7 900	10.2

38. One would predict that individual Y is MOST LIKELY suffering from

A. A-V valve damage
B. an iron deficiency
C. a bacterial infection
D. a poison attached to hemoglobin

---

39. Besides glucose, sources of energy for cellular metabolism include

A. minerals and vitamins
B. vitamins and proteins
C. fats and minerals
D. proteins and fats

40. In aerobic respiration, hydrogen electron acceptors assist in ATP production by

A. controlling the rate of CO_2 production
B. initiating the formation of lactic acid
C. moving electrons to progressively stronger acceptors
D. transferring electrons from the mitochondria to the ribosomes

41. Which of the following processes relies on locally elevated blood pressure?

A. Gas exchange
B. Nephron reabsorption
C. Glomerular filtration
D. Active transport of sodium ions in axon fibres

42. Blood that leaves the kidneys has lost almost all of its

A. urea
B. water
C. glucose
D. protein

43. Concentrated urine is formed when ADH is

A. lacking, and the tubules are permeable to water
B. abundant, and the tubules are permeable to water
C. lacking, and the tubules are impermeable to water
D. abundant, and the tubules are impermeable to water

44. Nearly ALL of the water that enters Bowman's capsule is

A. excreted from the body in the urine
B. reabsorbed by the circulatory system through osmosis
C. stored in the collecting duct until released by ADH stimulation
D. actively transported from the loop of Henle into the surrounding tissues

45. In an artificial kidney, blood is pumped through dialysis tubing (semipermeable tubing) which is immersed in a tank of washing or dialyzing solution. The blood is cleansed because

A. water from the wash solution enters the blood by osmosis
B. urea and other impurities diffuse into the wash solution
C. chemical cleansers diffuse into the blood from the wash solution
D. poisons from the blood are actively transported out of the tubing

46. Analysis of the fluid contained in various kidney structures would indicate that the highest concentration of urea is in

A. glomeruli
B. renal veins
C. Bowman's capsules
D. collecting ducts

Use the following information to answer question 47.

Substance in Body Fluid	Body Fluid		
	Blood Plasma	Glomerular Filtrate	Urine
Protein	7.00	0.00	0.00
Urea	0.04	0.04	2.00
Glucose	0.10	0.10	0.00
Sodium ions	0.32	0.32	0.35
Chloride ions	0.38	0.38	0.60
Ammonia	0.0001	0.0001	0.04
NOTE: Quantities indicate grams of substance per 100 mL of body fluid			

47. From the above data, one can conclude that after filtration

A. glucose is secreted
B. protein is secreted
C. protein is reabsorbed
D. glucose is reabsorbed

48. When a person undergoes water loss because of heavy perspiration, the loss of water from the blood will cause

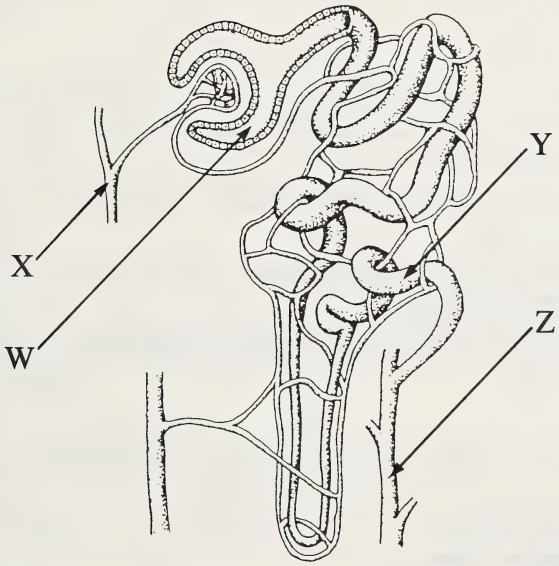
A. increased production of ADH
B. decreased production of ADH
C. decreased urea formation by the liver
D. increased urine formation by the kidneys

49. Arteriolar dilation throughout the body would cause urine production to decrease because the

A. blood pressure in the glomerular capillaries would decrease
B. blood pressure in the glomerular capillaries would increase
C. osmotic pressure of the blood plasma would increase
D. osmotic pressure of the blood plasma would decrease

Refer to the following diagram to answer question 50.

A Human Nephron



50. Proteins, urea, and metabolically important substances such as glucose are found in body fluids. In relation to excretion, which of the following is NOT correct?

A. Urea concentration is higher at W than at Z.
B. Glucose concentration is lower at Y than at X.
C. Protein concentration is higher at X than at Z.
D. Red blood cell concentration is lower at W than at X.

---

51. Abnormally high levels of thyroxin in the blood of an individual would

A. accelerate the conversion of glucose to glycogen
B. inhibit utilization of oxygen in cells
C. increase the metabolic rate
D. decrease the appetite

52. In persons with an insulin deficiency

A. glycogen appears in the urine
B. glucose utilization is impaired
C. glycogen builds up in the liver
D. pancreatic enzymes are inactivated

53. The thyroid gland can concentrate the iodide ion to about 25 times its normal concentration in the blood. This is a result of

A. diffusion
B. exocytosis
C. active transport
D. passive transport

54. What is the normal sequence of events following the stimulation of a neuron?

A. Rush of sodium ions into the axon, depolarization of axon membrane, refractory period

B. Rush of sodium ions into the axon, refractory period, depolarization of axon membrane

C. Depolarization of axon membrane, rush of potassium ions into the axon, refractory period

D. Refractory period, rush of sodium ions into the axon, depolarization of axon membrane

55. A nerve impulse that moves from a finger to the spinal cord travels along a

A. motor neuron
B. sensory neuron
C. sympathetic nerve
D. parasympathetic nerve

56. A nerve stimulus may be an environmental change that is capable of

A. neutralizing the charge of a neuron
B. changing the polarity of a neural membrane
C. initiating the refractory period of the cell membrane
D. initiating hormone release from the dendrites of a neuron

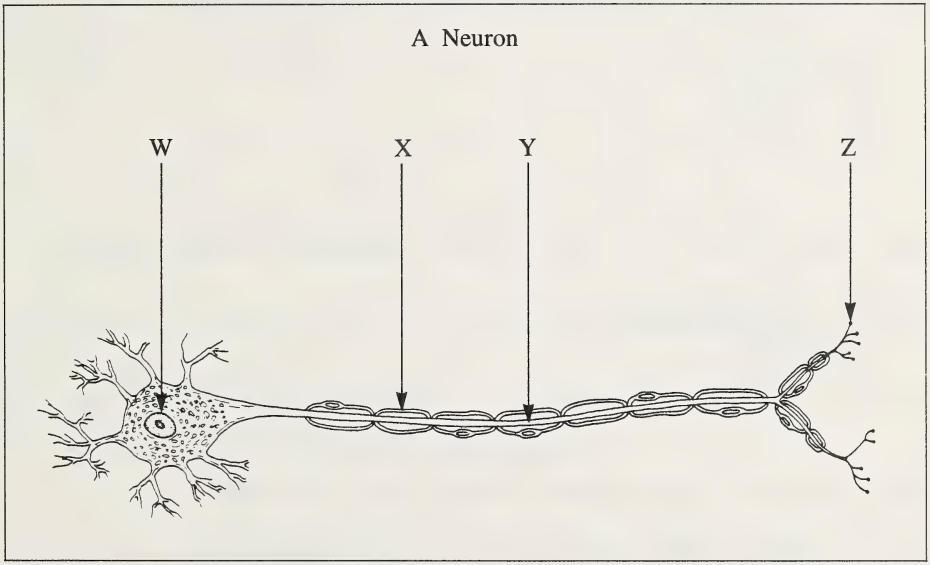
57. A person who accidentally touches a hot stove immediately withdraws the affected hand. The motor action involved is the result of

A. a reflex arc that does not require brain co-ordination
B. an automatic reflex regulated by parasympathetic nerves
C. an automatic reflex regulated by sympathetic nerves
D. a reflex arc that requires brain co-ordination

58. A motor neuron will stimulate an effector if

A. the refractory period does not exceed the resting period
B. the travelling impulse does not affect the polarity of the axon
C. inhibitory substances prevent an overload at the synaptic junction
D. sufficient excitatory impulses are received from association neurons

Refer to the following diagram to answer question 59.



59. The structure that greatly increases the speed of nerve impulse transmission is labelled

A. W
B. X
C. Y
D. Z

---

60. Some airlines offer their passengers chewing gum before takeoff. The biological phenomenon underlying this courtesy is that when one chews and swallows, air pressure is equalized between the air in the cabin and air in the

A. eardrum
B. cochlea
C. outer ear
D. middle ear

61. The parasympathetic nerve (vagus nerve) conducts impulses to the heart. If this nerve is severed, a likely result will be

A. a slower pulse
B. a lower blood pressure
C. an increase in heart rate
D. a decrease in arteriolar resistance

62. Of the structures that comprise a reflex arc, the muscle would be the

A. sensor
B. effector
C. receptor
D. stimulator

63. Motion sickness is the result of unusual stimulation of receptors in the

A. semicircular canals
B. Organ of Corti
C. cerebellum
D. cochlea

64. Stimulation of the sympathetic nervous system would result in

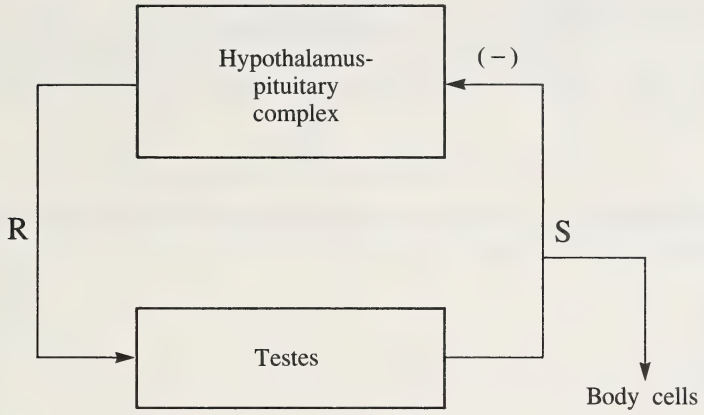
A. increased heart rate and a rise in blood adrenalin levels

B. decreased heart rate and a decrease in blood adrenalin levels

C. increased heart rate and decreased conversion of glycogen to glucose in the liver

D. decreased heart rate and increased conversion of glycogen to glucose in the liver

65. The following diagram shows a relationship between the hypothalamus-pituitary complex and the testes. R and S represent substances produced by these structures and then released into the circulatory system.



An increase in Substance S causes the hypothalamus-pituitary complex to

A. stimulate the testes
B. inhibit the release of Substance R
C. stimulate the release of Substance R
D. inhibit the pituitary's production of testosterone

---

66. In an experimental procedure on a rat, the auditory nerve was connected to the occipital lobe (vision) of the brain and the optic nerve was connected to the temporal lobe (hearing). After this procedure, shining a light in the rat's eyes would cause stimulation of the

A. temporal lobe and therefore a sensation of sound
B. temporal lobe and therefore a sensation of light
C. occipital lobe and therefore a sensation of sound
D. occipital lobe and therefore a sensation of light

67. The semicircular canals are sensitive to

A. pressure
B. body position
C. low frequency sound
D. high frequency sound

68. Malathion interferes with the enzyme cholinesterase (found at synaptic clefts). When Malathion is sprayed on insects, they undergo continuous muscular contractions. These contractions occur because

A. acetylcholine dissolves the actin and myosin filaments
B. acetylcholine is not destroyed and therefore there is no refractory period
C. cholinesterase initiates the release of hormones needed for muscular contraction
D. cholinesterase increases the manufacture of ATP, and this increases energy for contractions

69. The cells of which tissue or organ would be expected to contain the HIGHEST concentration of mitochondria?

A. Fat
B. Lung
C. Blood
D. Muscle

70. A scientist added a certain chemical to a culture of cells. It was observed that the production of ATP stopped, and soon thereafter the movement of cilia stopped. From these observations, the scientist may infer that the movement of cilia is

A. an energy-producing process
B. dependent upon cellular respiration
C. independent of the use of high energy phosphate bonds
D. directly related to the amount of chemical added to the culture

71. After a 400 m race, four athletes were tested. From blood and tissue samples, the following observations were made:

Athlete	Creatine Phosphate (mg/mL)	Calcium (mg/mL)	ATP (mg/mL)
W	0.02	0.83	0.33
X	0.02	0.75	0.27
Y	0.03	0.97	0.61
Z	0.01	0.51	0.16

The athlete who would have experienced the greatest muscular fatigue is

A. W
B. X
C. Y
D. Z

---

72. A muscle capable of rapid contraction is compared structurally with one incapable of rapid contraction. Such a comparison would reveal

A. few observable differences between muscles
B. more mitochondria in the muscle capable of rapid contraction
C. more actin than myosin in the muscle capable of rapid contraction
D. higher levels of oxygen in the muscle incapable of rapid contraction

73. The thickening of the lining of the uterus is in direct response to increased levels of

A. oxytocin
B. estrogen
C. FSH
D. LH

74. If the Fallopian tubes were blocked completely

A. ovulation would not occur
B. eggs would not be produced
C. fertilization would not take place
D. sperm would not be able to enter the uterus

75. What is the immediate effect of a high level of luteinizing hormone (LH) on the ovary?

A. Prevents ovulation
B. Delays menstruation
C. Stimulates ovulation
D. Stimulates menstruation

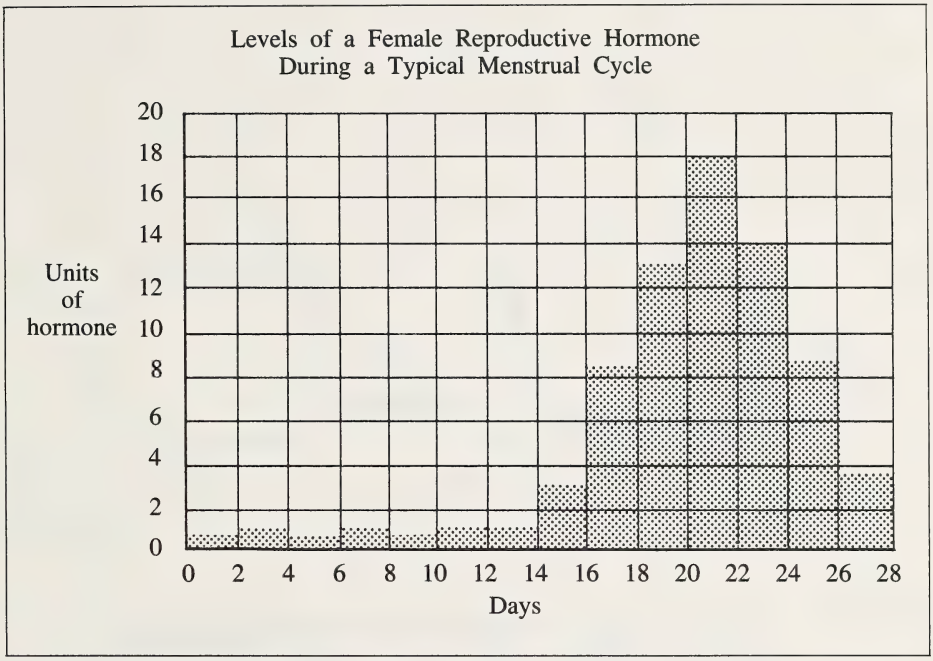
76. In the human male, production of sperm occurs in the

A. epididymis
B. vas deferens
C. prostate gland
D. seminiferous tubules

77. If the testes of a male child do not descend normally, and remain in the abdominal cavity, sterility may result because

A. a hernia would occur
B. the seminiferous tubules would be blocked
C. the prostate gland would be prevented from functioning
D. the temperature for viable sperm production would be too high

Use the following information to answer questions 78 and 79.



78. The hormone represented in the graph is

A. FSH
B. oxytocin
C. estrogen
D. progesterone

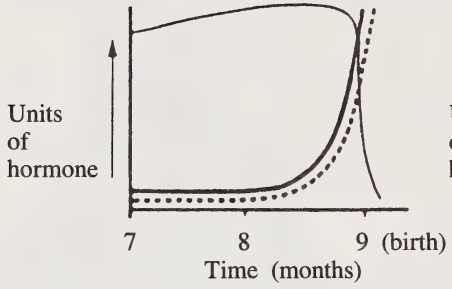
79. The increasing levels of this hormone after day 14 is a result of the

A. formation of the corpus luteum
B. formation of the placenta
C. shedding of the uterine lining
D. increased ovarian follicular growth

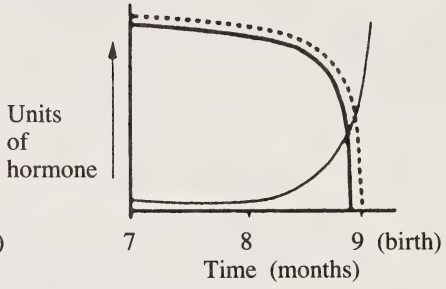
80. Which graph illustrates the most likely interaction of hormones during the later stages of pregnancy?

progesterone relaxin oxytocin

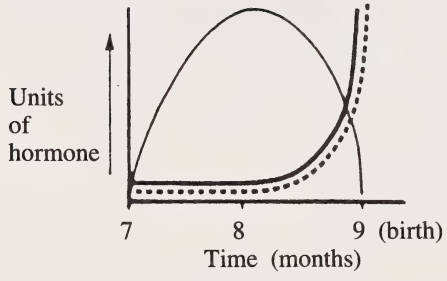
A.



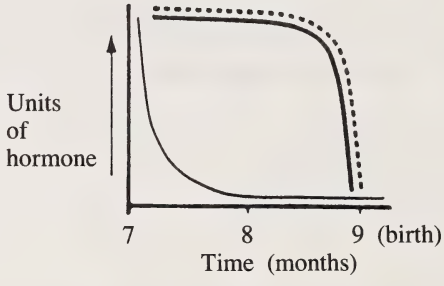
B.



C.



D.



YOU HAVE NOW COMPLETED THE MULTIPLE-CHOICE SECTION OF THE EXAMINATION. PLEASE PROCEED TO THE NEXT PAGE AND ANSWER THE WRITTEN-RESPONSE QUESTIONS IN PART B.

PART B

INSTRUCTIONS

Please write your answers in the examination booklet as neatly as possible.

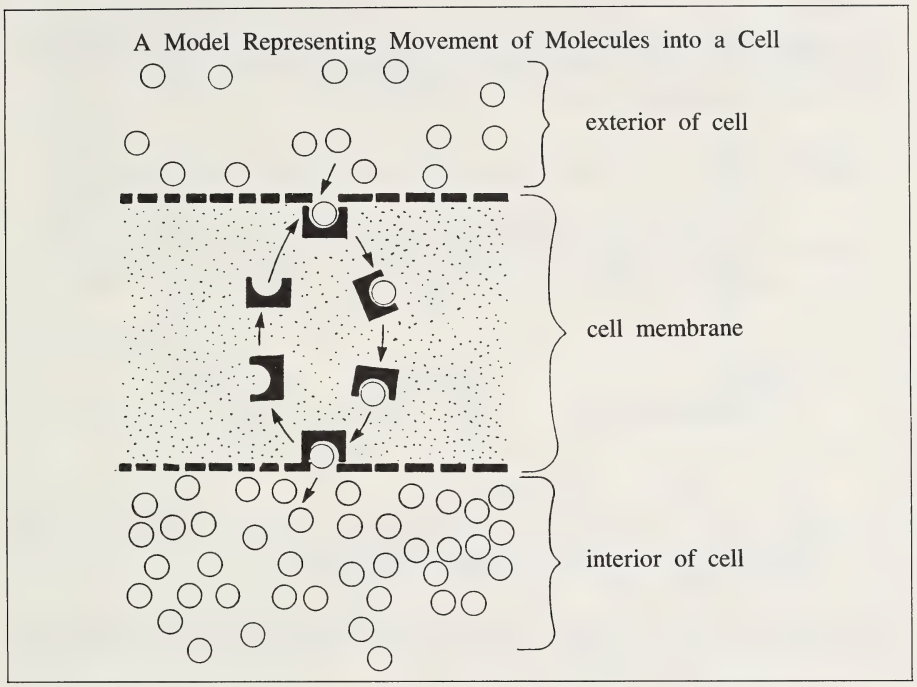
Communicate your answers in clear, concise sentences. Marks will be awarded for pertinent explanations and answers.

NOTE: The perforated pages at the back of this booklet may be torn out and used for your rough work.

TOTAL MARKS: 20

START PART B IMMEDIATELY

Use the following diagram to answer question 1.

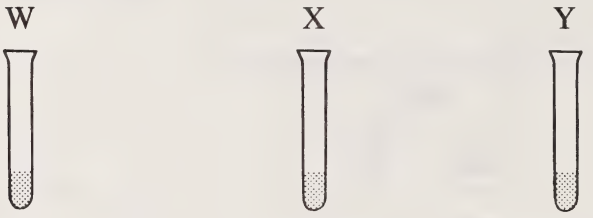


1. Using complete sentences, describe the process by which the molecules represented in the diagram move across the membrane. Include a comparison between the process you have selected and TWO other processes by which molecules can move across cell membranes. **(4 marks)**

FOR DEPARTMENT USE ONLY

Use the following information to answer question 2.

A student set up test tubes W, X, and Y with contents as shown to investigate the digestion of a lipid. The contents of each test tube were incubated at 37°C for one hour and then tested with blue litmus paper.



W	X	Y
olive oil distilled water	olive oil distilled water bile	olive oil distilled water bile lipase

Note: Blue litmus paper turns a reddish color in an acidic environment, but remains blue in a basic or neutral environment.

(6 marks)

2. Predict the color of the litmus paper for each test tube. Explain your predictions.

Test tube W

Color _____

Explanation _____

_____

Test tube X

Color _____

Explanation _____

_____

Test tube Y

Color _____

Explanation _____

_____

FOR DEPARTMENT USE ONLY

Use the following information to answer question 3.

An experiment was conducted to gain information concerning the effects of coffee consumption on blood pressure.

Procedure:

1. The experiment took place in a laboratory where the physical environment was controlled.
2. The subjects drank coffee together over a 30-minute period.
3. Accurate blood pressure readings were taken at the end of the 30-minute period while the subjects were at rest and in a sitting position.

Observations:

Subject	Cups of Coffee	Systolic/Diastolic
John	1	17/10.7 kPa (128/80 mm Hg)
Linda	2	18.7/12.3 kPa (140/92 mm Hg)
Mary	4	18/10 kPa (135/75 mm Hg)
Wallie	6	26.5/12 kPa (199/90 mm Hg)

3. Name three errors in the design of this experiment and explain how each of these errors could lead to incorrect conclusions. **(6 marks)**

Error 1 _____

Explanation _____

_____

Error 2 _____

Explanation _____

_____

Error 3 _____

Explanation _____

_____

FOR DEPARTMENT USE ONLY

(2 marks)

4. Assume a rare virus destroys only the sperm-producing cells in the testes of an immature human male. Explain the effect, if any, of this disease on the development of secondary sex characteristics as the male matures.

_____

_____

_____

_____

_____

_____

Use the following information to answer question 5.

Subjects A, B, C, D, and E were placed in five different rooms containing air with the percentage of gases shown. Assume each of the subjects was of the same age, weight, sex, and physical condition.

Subject	Oxygen %	Carbon Dioxide %	Nitrogen %
A (control)	21	0.04	78
B	15	0.01	85
C	20	3.00	77
D	21	5.00	74
E	21	0.04	78

(2 marks)

5. Predict which subject will have the highest breathing rate while resting. Present an argument based on the data provided to support your prediction.

_____

_____

_____

_____

_____

_____

YOU HAVE NOW COMPLETED THE EXAMINATION. IF YOU HAVE TIME, YOU MAY WISH TO GO BACK AND CHECK YOUR ANSWERS.

TEAR-OUT SHEET

(NO MARKS WILL BE GIVEN FOR WORK DONE ON THIS PAGE)

FOLD AND TEAR ALONG PERFORATION

TEAR-OUT SHEET

(NO MARKS WILL BE GIVEN FOR WORK DONE ON THIS PAGE)

FOLD AND TEAR ALONG PERFORATION

TEAR-OUT SHEET

(NO MARKS WILL BE GIVEN FOR WORK DONE ON THIS PAGE)

FOLD AND TEAR ALONG PERFORATION

TEAR-OUT SHEET

(NO MARKS WILL BE GIVEN FOR WORK DONE ON THIS PAGE)

FOLD AND TEAR ALONG PERFORATION

TEAR-OUT SHEET

(NO MARKS WILL BE GIVEN FOR WORK DONE ON THIS PAGE)

FOLD AND TEAR ALONG PERFORATION

TEAR-OUT SHEET

(NO MARKS WILL BE GIVEN FOR WORK DONE ON THIS PAGE)

FOLD AND TEAR ALONG PERFORATION

TEAR-OUT SHEET

(NO MARKS WILL BE GIVEN FOR WORK DONE ON THIS PAGE)

FOLD AND TEAR ALONG PERFORATION

FOR DEPARTMENT USE ONLY

M1 M2 M3 M4

FOR DEPARTMENT USE ONLY

BIOLOGY 30

NAME: (LAST NAME) (FIRST NAME) DATE OF BIRTH: Y M D SEX:

PERMANENT MAILING ADDRESS: _____
(Apt./Street/Ave./P.O. Box) (Village/Town/City) (Postal Code)

SCHOOL CODE: SCHOOL: _____ SIGNATURE: _____

FOR DEPARTMENT USE ONLY

BIOLOGY 30